

1 What is claimed is:

2 1. A method for applying multi-resolution boundary encoding to region based still image and  
3 video encoding, comprising:

4 dividing an original image into a plurality of regions, wherein a plurality of boundaries  
5 associated with the plurality of the regions is detected;

6 encoding each of the plurality of the boundaries, whereby each of the plurality of the boundaries  
7 contains different resolution coefficients;

8 decomposing each of the plurality of the regions in the original image into one or more  
9 subbands using the plurality of the boundaries with the highest resolution coefficients;

10 successively decomposing each of the plurality of the regions in a subband with lower  
11 resolution coefficients into one or more subbands using the plurality of the boundaries with lower  
12 resolution coefficients;

13 transmitting boundary and image information with the lowest resolution coefficients; and  
14 successively transmitting boundary and image information with higher resolution coefficients.

15  
16 2. The method of claim 1, wherein the encoding step includes encoding each of the plurality  
17 of the boundaries by two periodic wavelet series, whereby each of the plurality of the boundaries  
18 contains different resolution coefficients in each of the two periodic wavelet series.

19 3. The method of claim 1, wherein the decomposing step includes decomposing each of the  
20 plurality of the regions in the original image into four subbands using a region based subband  
21 encoding scheme.

22 4. The method of claim 3, wherein the decomposing step includes decomposing each of the  
23 plurality of the regions in the original image into a subband using low pass horizontal and low pass  
24 vertical frequency filters.

25 5. The method of claim 3, wherein the decomposing step includes decomposing each of the  
26 plurality of the regions in the original image into a subband using high pass horizontal and low pass  
27 vertical frequency filters.

28 6. The method of claim 3, wherein the decomposing step includes decomposing each of the  
29 plurality of the regions in the original image into a subband using low pass horizontal and high pass  
30 vertical frequency filters.

1       7.     The method of claim 3, wherein the decomposing step includes decomposing each of the  
2       plurality of the regions in the original image into a subband using high pass horizontal and high pass  
3       vertical frequency filters.

4       8.     The method of claim 1, wherein the successively decomposing step includes successively  
5       decomposing for at least three levels of decomposition.

6       9.     The method of claim 1, further comprising reconstructing image information at a higher  
7       resolution in a receiver by combining the image information in the one or more lowest resolution  
8       subbands.

9       10.    The method of claim 9, further comprising successively reconstructing image information  
10      at a yet higher resolution in the receiver by combining the image information in the one or more  
11      lower resolution subbands, until the original image is reconstructed.

12      11.    An apparatus for applying multi-resolution boundary encoding to region based still image  
13      and video encoding, comprising:

14           means for dividing an original image into a plurality of regions, wherein a plurality of  
15           boundaries associated with the plurality of the regions is detected;

16           means for encoding each of the plurality of the boundaries, whereby each of the plurality  
17           of the boundaries contains different resolution coefficients;

18           means for decomposing each of the plurality of the regions in the original image into one or  
19           more subbands using the plurality of the boundaries with the highest resolution coefficients;

20           means for successively decomposing each of the plurality of the regions in a subband with  
21           lower resolution coefficients into one or more subbands using the plurality of the boundaries with  
22           lower resolution coefficients;

23           means for transmitting boundary and image information with the lowest resolution  
24           coefficients; and

25           means for successively transmitting boundary and image information with higher resolution  
26           coefficients.

27       12.    The apparatus of claim 11, wherein the means for encoding step includes means for  
28       encoding each of the plurality of the boundaries by two periodic wavelet series, whereby each of  
29       the plurality of the boundaries contains different resolution coefficients in each of the two periodic  
30       wavelet series.

1       13. The apparatus of claim 11, wherein the means for decomposing step includes means for  
2 decomposing each of the plurality of the regions in the original image into four subbands using a  
3 region based subband encoding scheme.

4       14. A computer readable medium providing instructions for applying multi-resolution boundary  
5 encoding to region based still image and video encoding, the instructions comprising:

6               dividing an original image into a plurality of regions, wherein a plurality of boundaries  
7 associated with the plurality of the regions is detected;

8               encoding each of the plurality of the boundaries, whereby each of the plurality of the  
9 boundaries contains different resolution coefficients;

10              decomposing each of the plurality of the regions in the original image into one or more  
11 subbands using the plurality of the boundaries with the highest resolution coefficients;

12              successively decomposing each of the plurality of the regions in a subband with lower  
13 resolution coefficients into one or more subbands using the plurality of the boundaries with lower  
14 resolution coefficients;

15              transmitting boundary and image information with the lowest resolution coefficients; and

16              successively transmitting boundary and image information with higher resolution coefficients.

17       15. The computer readable medium of claim 14, wherein the instructions for encoding step  
18 includes encoding each of the plurality of the boundaries by two periodic wavelet series, whereby  
19 each of the plurality of the boundaries contains different resolution coefficients in each of the two  
20 periodic wavelet series.

21       16. The computer readable medium of claim 14, wherein the instructions for decomposing step  
22 includes decomposing each of the plurality of the regions in the original image into four subbands  
23 using a region based subband encoding scheme.

24       17. The computer readable medium of claim 16, wherein the instructions for the decomposing  
25 step includes decomposing each of the plurality of the regions in the original image into a subband  
26 using low pass horizontal and low pass vertical frequency filters.

27       18. The computer readable medium of claim 16, wherein the instructions for the decomposing  
28 step includes decomposing each of the plurality of the regions in the original image into a subband  
29 using high pass horizontal and low pass vertical frequency filters.

- 1        19. The computer readable medium of claim 16, wherein the instructions for the decomposing  
2        step includes decomposing each of the plurality of the regions in the original image into a subband  
3        using low pass horizontal and high pass vertical frequency filters.  
4        20. The computer readable medium of claim 16, wherein the instructions for the decomposing  
5        step includes decomposing each of the plurality of the regions in the original image into a subband  
6        using high pass horizontal and high pass vertical frequency filters.